

## Revision of the Genus *Endeodes* LeConte with a Tabular Key to the Species (Coleoptera: Melyridae)

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**Abstract:** Species of the genus *Endeodes* are known only from the seashore of Pacific North America. *E. fasciatus*, *E. rothi* and *E. intermedius*, n. spp., are from the upper Gulf of California. A tabular key to the nine known species is given. The pronotum and elytron of each species is illustrated.

LeConte (1859) included three species from California when he described the genus *Endeodes*. Blackwelder (1932) reviewed the genus and added two more California species, Moore (1954) reviewed the genus, added a new species from the Pacific Coast of Baja California Norte, Mexico and reduced one of LeConte's species to synonymy. Marshall (1957) described a new species from the south end of the Gulf of California, and Moore (1964) reviewed the genus again adding another species from Sonora, Mexico.

The species of this genus are rather unusual in their intertidal habitat. Some are found on the sandy Pacific beaches of southern California and Baja California where they are usually encountered under debris, often patches of dried seaweed. Other species occur from California northward on reefs exposed at low tide. The Gulf of California supports another group of species which is also found on rocky shores at low tide.

The genus *Endeodes* may be distinguished from other members of the family Melyridae by the combination of the following characters (Arnett 1962): first sternite not keeled between the coxae, eye simple, head neither rostrate nor excavated, protrusible vesicles present on prothorax and between metathorax and abdomen, abdomen without bristles, elytra strongly abbreviated, protarsus 5-segmented, antenna 11-segmented.

Males of *Endeodes* may be distinguished from females by the presence on the protarsus of an elongated swollen second segment which terminates in a comb of thick black setae.

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The larva of *insularis* was described by Moore (1956) and a key to the larvae of three species was given by Moore (1964). A pupa doubtfully identified as *insularis* was figured by Moore (1954).

In this paper we describe three new species from the upper Gulf of California, reduce one species to synonymy and present a tabular key to the species. Drawings are given of the pronotum and an elytron of each species. The pronota and elytra offer the best characters for specific separation.

The construction and use of tabular keys, developed by I. M. Newell, were discussed in two recent papers (Newell 1970, 1972).

#### STATEMENT OF CHARACTERS

1. Ratio of length to width of elytron = RAT. LEN. WID. ELY.  
(5.4 to 12.4)
  2. Shape of apex of elytra = SHAPE APEX ELY.  
ARCU = arcuate  
TRUN = subtruncate, apex straight centrally with the angles broadly rounded
  3. Color of elytra = COL. ELY.  
PICE = piceus  
FERR = entirely ferruginous  
BASE = piceus with the base ferruginous  
APEX = piceus with the apex ferruginous  
MIX = general mixture of piceus and ferruginous
  4. Sculpture of elytra = SCUL. ELY.  
ROUG = surface rough and microreticulate  
SMOO = surface not rough except for microreticulation
  5. Ratio of width to length of pronotum = RAT. WID. LEN. PRON.  
(6.4 to 4.4)
  6. Shape of pronotum = SHAPE PRON.  
TRAN = transverse, not constricted at base  
CORD = cordate, not or hardly transverse, constricted at base
  7. Color of head = COL. HEAD  
PICE = entirely piceus  
FERR = yellow to ferruginous  
VARI = variable from ferruginous to ferruginous with dark areas  
Distribution = DISTR.  
NoPac = California and Pacific Northwest  
Cal = California  
C & B = California and Pacific Baja California  
Baja = Pacific Baja California  
Son = Sonora, Mexico  
Gul = Baja California gulf coast
- Source  
SPM = specimen  
Par = paratype  
Hol = holotype

Tabular key to the species of *Endeodes*

1	2	3	4	5	6	7			
RAT. LENG. WID. ELY.	SHAPE APEX ELY.	COL. ELY.	SCUL. ELY.	RAT. WID. LEN. PRON.	SHAPE PRON.	COL. HEAD	Distr.	Source	Name
12.4	Trun	Mix	Smoo	5.4	Tran	Ferr	Son	Hol	<i>fasciatus</i>
12.4	Arcu	Apex	Smoo	5.4	Tran	Ferr	Gulf	Spm	<i>terminalis</i>
9.4	Arcu	Mix	Roug	4.4	Cord	Ferr	Son	Hol	<i>rothi</i>
8.4	Arcu	Ferr	Smoo	4½.4	Tran	Ferr	Son	Hol	<i>sonorensis</i>
8.4	Arcu	Base	Roug	4.4	Cord	Ferr	C & B	Spm	<i>basalis</i>
8.4	Trun	Ferr	Roug	4.4	Cord	Ferr	Baja	Par	<i>blaisdelli</i>
7.4	Arcu	Mix	Smoo	4½.4	Tran	Ferr	Son	Hol	<i>intermedius</i>
5.4	Arcu	Pice	Roug	6.4	Tran	Pice	NoPac	Spm	<i>collaris</i>
5.4	Arcu	Ferr	Roug	6.4	Tran	Ferr	Cal	Par	<i>insularis</i>

*Endeodes fasciatus* n. sp.

Description of holotype, male.

*Color.* Head, pronotum and appendages ferruginous; clypeus testaceous; eyes black; elytra ferruginous with a common piceus spot at inner apical angles which also embraces apical two-thirds of scutellum, and a piceus band across just below the middle leaving the apices bright ferruginous; beneath largely dark except head which is ferruginous.

*Head.* Oval, about as wide as long, tempora about as long as eye; surface rather strongly microreticulate, very finely punctured and pubescent, the punctures generally separated by more than their diameters; antennae semi-monilliform, second segment about as long as third, tenth segment very little longer than wide.

*Pronotum.* About one-fourth wider than long, widest centrally; apex and base each evenly arcuate into sides so that the angles are not prominent; surface rather strongly microreticulate, very finely and sparsely punctured and pubescent, the punctures separated by more than twice their diameters.

*Elytra.* Each elytron a little more than twice as long as wide; humerus rather narrowly rounded, sides straight to the just perceptibly inflated apex; outer apical angles broadly rounded into the briefly truncate apex; inner apical angles more narrowly rounded. Surface smooth except for a dense but fine microreticulation. Pubescence very fine, short and sparse.

*Abdomen.* Upper surface concealed by the elytra either due to deformity or damage, the abdomen being displaced forward so that the basal segments override the metathorax.

*Length.* About 2.5 mm. This specimen would probably be about 3 mm long except for the abnormal abdomen.

*Specimen described.* Holotype, male, Mexico, Sonora, Punta Cirio (29.53°-112.50°) 20 March 1974, from seaweed lying on a 2" to 6" boulder strewn beach, V. Roth and W. Brown collectors. Deposited in American Museum of Natural History, New York City.

*Notes.* This species is distinct in its small size, relatively long semitruncate elytra and the color pattern of the elytra.

*Endeodes terminalis* Marshall

*Endeodes terminalis* Marshall 57-13; Moore 64-58; Moore 71-278.

*Color.* Head ferruginous with the disc near base infumate; pronotum yellow; elytra piceus

in basal three-fourths with apex abruptly yellow, dividing line between the two colors oblique; abdomen and scutellum piceus; legs and antennae ferruginous and infumate.

*Head.* Oval, about one-fourth wider than long; tempora about as long as eye; surface densely microreticulate, pubescence fine and moderately dense, punctures imperceptible; antenna with second segment not quite as long as third, tenth segment short, as wide as long.

*Pronotum.* About one-fifth wider than long; apex arcuate, evenly rounded into the broadly rounded apical angles, sides briefly straight and convergent, basal angles broadly rounded into the arcuate base, base narrower than apex. Surface sculpture and pubescence very similar to that of head.

*Elytra.* Each elytron about two and two-thirds times as long as wide; humerus broadly rounded, sides straight and somewhat divergent, outer apical angles broadly rounded into the arcuate apex, inner apical angles broadly rounded. Surface sculpture and pubescence very similar to that of foreparts.

*Abdomen.* As finely but not as densely sculptured and pubescent as elytra.

*Length.* About 3.5 mm.

*Specimen examined.* One female, Mexico, Baja California Norte, Puertocito, 31 May 1963, T. Palmer collector. This specimen is accompanied by a larva and a pupa.

*Notes.* The elytra are the longest in the genus leaving little more than two abdominal segments exposed. The type locality was given as "Baja California, Mexico, S.E. and Isla Caballo, III-30-53." This locality proved to be an error for Isla Ceralbo at the very southern part of the Gulf of California (Moore 1971). The new locality for the specimen described above is five hundred and fifty miles north in the upper Gulf of California.

*Endeodes rothi* n. sp.

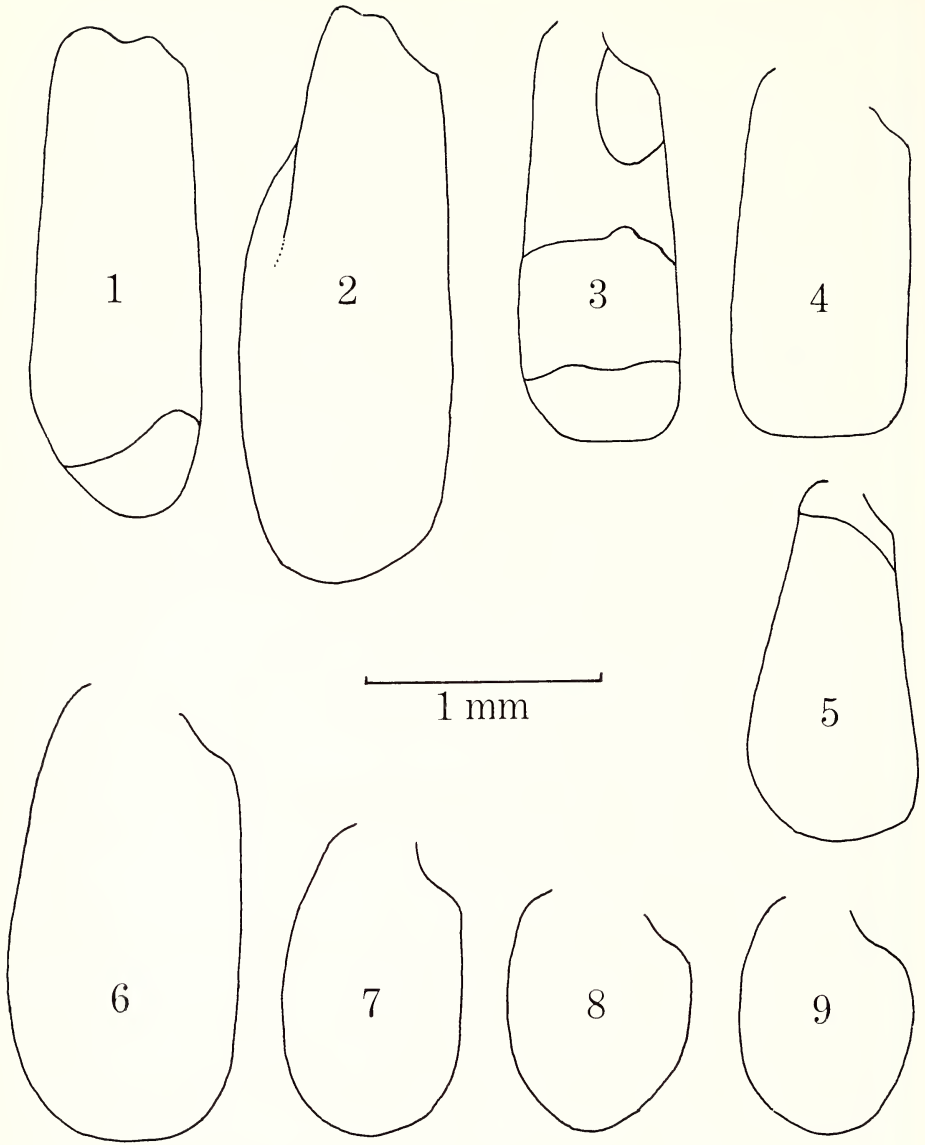
Description of holotype, female.

*Color.* Head, pronotum and appendages bright ferruginous; clypeus testaceous; eyes black; elytra with base, apex and marginal beeding ferruginous, disc piceus; abdomen largely piceus with the basal, lateral and apical margins of anterior segments ferruginous; beneath ferruginous except for patches of piceus on terminal abdominal segments.

*Head.* Oval, a little longer than wide; tempora about one and one-half times as long as eye; surface finely microreticulate, very finely punctured and pubescent, the punctures generally separated by more than their diameters; antennae with all the segments longer than wide, second segment almost as long as third, tenth segment half again as long as wide.

*Pronotum.* About as wide as long, widest at apical third; apex broadly rounded, evenly rounded into apical angles, thence sharply constricted in basal third to the narrowly rounded basal angles; base gently arcuate; surface somewhat impressed in center of base; base four-fifths as wide as pronotum. Surface very finely microreticulate and shining. Punctures very fine, generally separated by about twice their diameters.

*Elytra.* Each elytron a little more than twice as long as wide; humerus broadly rounded, sides thence nearly straight for a short distance, thence widened and broadly arcuate to the widest point at about four-fifths of the length, thence broadly rounded into the evenly arcuate apex. Elytra conjointly appear sharply constricted at basal third and widely inflated in basal two-thirds, the surface flattened in basal third. Sculpture rough and rather strongly



FIGS. 1-9, elytra of *Endeodes*:

1. *terminalis*
3. *fasciatus*
5. *basalis*
7. *intermedius*
9. *collaris*

2. *rothi*
4. *blaisdelli*
6. *sonorensis*
8. *insularis*

microreticulate with fine punctures separated generally by at least twice their diameters. Pubescence of fine decumbent pale hairs and sparse coarse long dark setae.

*Abdomen.* About as wide as elytra. Microreticulation a little finer than on elytra. Punctures very sparse. Pubescence very fine.

*Length.* About 4.8 mm.

*Specimen examined.* Holotype, female, Mexico, Sonora, Punta Cirio (29.53°–112.50°), March 20, 1974, from seaweed on 2"–6" boulder strewn beach, V. Roth and W. Brown collectors, in collection of The American Museum of Natural History, New York City.

*Notes.* This is the most distinctive species in the genus. It differs from the other species particularly in its longer tempora, elongate antennomeres and the fact that the elytra are conjointly constricted at the base and inflated in the apical two-thirds. The shape of the pronotum is similar to that of the Pacific Coast species *basalis* and *blaisdelli*. This species is named in honor of one of its collectors, Vincent D. Roth.

*Endeodes sonorensis* Moore

*Endeodes sonorensis* Moore 64–57, 58.

*Color.* Head and pronotum ferruginous; legs ferruginous with the femora infumate, antennae ferruginous becoming darker apically; elytra piceus with humerus very narrowly ferruginous; abdomen largely ferruginous with a piceus central cloud on each segment, last segment mostly piceus; beneath ferruginous except for piceus metasternum and last abdominal segment.

*Head.* Oval, a little wider than long; tempora about as long as eyes; surface without ground sculpture, finely punctured, the punctures generally separated by about their diameters; pubescence very fine. Antennae semi-monilliform, second segment slightly shorter than third, tenth a little longer than wide.

*Pronotum.* A little wider than long, widest at apical fourth; apex arcuate, anterior angles broadly rounded, sides thence straight and convergent to broadly rounded basal angles, base straight, narrower than apex; without ground sculpture; punctures and pubescence very similar to that of head.

*Elytra.* Each elytron about twice as long as wide; humeral angle narrowly rounded, sides gently arcuate into broadly arcuate apex. Surface sculpture a dense but fine microreticulation, otherwise smooth except for a small central slightly rough patch.

*Abdomen.* A little wider than conjoint elytra; punctures and pubescence similar to that of pronotum.

*Length.* About 4 mm.

*Specimen examined.* Holotype, female, Mexico, Sonora, Punta De Los Cuervos, San Carlos Bay, near Guaymas, 18 November 1962, intertidal reef, Ian Moore collector, in collection of California Academy of Sciences, San Francisco.

*Notes.* This species resembles *intermedius* but differs in its longer elytra and other details. We have also seen one male and one female from Mexico, Sonora, Kino Bay, 21–22 September 1973, V. Roth and W. Brown collectors. These specimens are similar to the holotype except that the abdomen and metasternum of one are entirely ferruginous and in the other slightly infumate.

*Endeodes basalis* (LeConte)

*Atelestus basalis* LeConte 52-168.

*Atelestus abdominalis* LeConte 52-168, **New Synonym.** (This synonymy was suggested by Moore, 1954, but not clearly indicated.)

*Endeodes basalis* LeConte 59-122; Horn 72-112; Blackwelder 32-134; Moore 54-196, 197; Moore 57-140; Moore 64-158.

*Endeodes abdominalis* LeConte 52-122; Horn 72-112; Blackwelder 32-134.

*Color.* Head, pronotum and antennae ferruginous, legs ferruginous with the femora infumate, elytra largely piceus with the base ferruginous, abdomen piceus.

*Head.* Oval, about as wide as long; tempora about one and one-half times as long as eye; surface very finely, densely microreticulate; pubescence fine, short and moderately dense, punctures imperceptible; antenna with second segment slightly more than half as long as third, tenth segment slightly longer than wide.

*Pronotum.* About as long as wide; widest at about apical third; apex arcuate into the broadly rounded apical angles; sides briefly constricted just before the rounded basal angles; base slightly emarginate. Sculpture and pubescence very similar to that of head.

*Elytra.* Each elytron about twice as long as wide, humeral angle narrowly rounded, sides straight and diverging to the broadly rounded outer apical angles, apex arcuate, inner apical angles narrowly rounded. Surface rough and with dense microreticulation. Punctures and pubescence much as on the elytra with added long scattered erect setae.

*Abdomen.* Sculpture, punctures and pubescence very similar to that of elytra.

*Length.* About 3.5 mm.

*Specimen described.* Female, California, San Luis Obispo County, Cambria, 21 August 1972, under dry seaweed on berm of beach, Ian Moore collector.

*Notes.* This species is distinct in the combination of its long piceus elytra with the base pale and its cordate pronotum. The color of the abdomen is variable, ranging from entirely ferruginous to entirely piceus with many intergrades (Moore 1954) which led LeConte to describe one color form under the name *abdominalis*. It is reported from Ensenada, Baja California, Mexico to Monterey County. It is most commonly found under dried seaweed and other debris on the berm of the sandy beaches.

*Endeodes blaisdelli* Moore

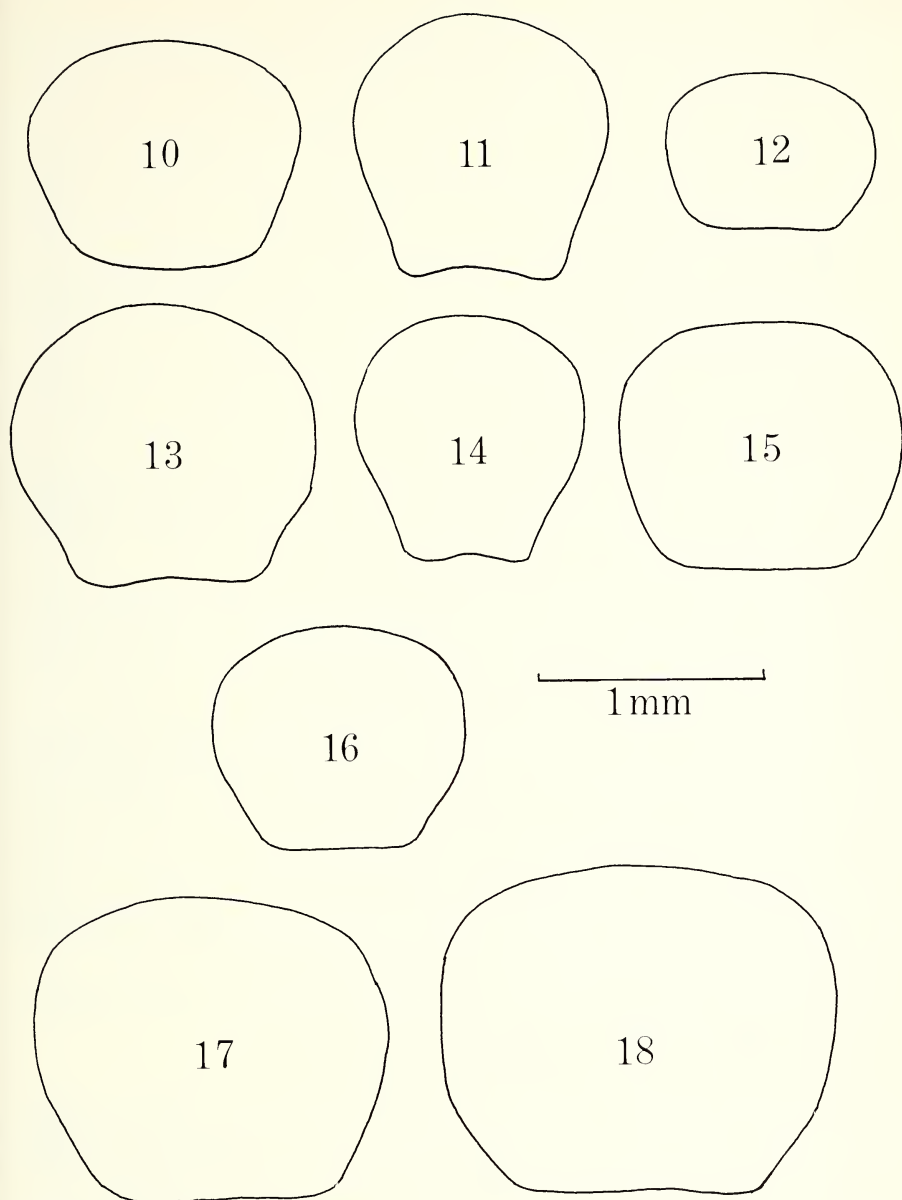
*Endeodes blaisdelli* Moore 54-196; Moore 64-58.

*Color.* Entirely dull ferruginous except eyes, tips of mandibles black and abdomen above and beneath piceus.

*Head.* Oval, about as wide as long; tempora slightly longer than eye; finely densely microreticulate throughout; finely pubescent but not perceptibly punctured. Antenna with the second segment about half as long as third, tenth segment slightly longer than wide.

*Pronotum.* About as wide as long, widest at about apical third; apex arcuate into the broadly rounded apical angles, sides briefly constricted just before the rounded basal angles base very slightly emarginate. Sculpture and pubescence similar to that of head.

*Elytra.* Each elytron about twice as long as wide; humeral angles narrowly rounded, sides straight and slightly diverging to the broadly rounded outer apical angles; apex straight,



FIGS. 10-18, pronota of *Endeodes*:

- 10. *terminalis*
- 12. *fasciatus*
- 14. *basalis*
- 16. *intermedius*
- 18. *collaris*

- 11. *rothi*
- 13. *blaisdelli*
- 15. *sonorensis*
- 17. *insularis*



inner apical angles broadly rounded. Surface rough and with dense microreticulation. Pubescence fine and sparse with a few long, erect, pale setae.

*Abdomen.* Microreticulation more sparse than that of foreparts, punctures and pubescence very fine and sparse.

*Length.* About 3 mm.

*Specimens examined.* Seven paratypes, Mexico, Baja California, Colonia Guerrero, 19 August 1950, Ian Moore collector.

*Notes.* This species is easily known from all the others except *fasciatus* by its long, truncate elytra; it differs from *fasciatus* in its cordate pronotum and concolorous elytra. It is known only from the type locality.

*Endeodes intermedius* n. sp.

Description of holotype, female.

*Color.* Head, pronotum, legs and under surface of abdomen ferruginous; eyes and tips of mandibles black; antenna largely ferruginous becoming darker apically; elytra piceus on disc with a narrow ferruginous rim, a little widest as base; abdomen largely piceus with edges of basal segments testaceous.

*Head.* Oval, very slightly longer than wide; tempora about one-half longer than eyes; surface just perceptibly microreticulate, shining; moderately, coarsely punctured, the punctures generally separated by about their diameters; antennae semi-monilliform, second segment two-thirds as long as third, tenth segment hardly longer than wide.

*Pronotum.* Slightly wider than long, widest at apical third, apex gently arcuate into the broadly arcuate anterior angles, sides thence convergent and nearly straight to the more narrowly rounded basal angles, base nearly straight but slight emarginate centrally; base about four-fifths as wide as apex. Surface without microsculpture; punctures dense, separated by less than their diameters; pubescence short and dark.

*Elytra.* Each elytron a little less than twice as long as wide: humerus narrowly rounded, sides briefly straight, thence arcuate into the very broadly rounded outer apical angles; surface vaguely impressed near scutellum; surface finely microreticulate; punctures and pubescence much like those of pronotum.

*Abdomen.* Reticulation a little finer than on elytra; punctures and pubescence a little more dense and fine than on elytra.

*Length.* About 4 mm.

*Specimen described.* Holotype, female, Mexico, Sonora, Punta Cuevas (29.42°–112.35°), 24–5 September, 1973, V. Roth and W. Brown collectors, on algae covered pitted rhyolite, at night during low tide, in the collection of The American Museum of Natural History, New York City.

Allotype, male, Mexico, Sonora, Puerto de Lobos (30.16°–112.50°), March 18–19, 1974, V. Roth and W. Brown collectors.

Paratype, one female, same data as holotype.

*Notes.* The name *intermedius* was chosen for this species because the elytra are intermediate in length between those of *collaris* and *insularis* and those of the other species. The shape of the pronotum along with that of *sonorensis* is intermediate between that of *basalis* and

*blaisdelli* and that of the other species. The lengths of the antennal segments along with those of *sonorensis* are intermediate between those of *rothi* and the other species.

*Endeodes collaris* (LeConte)

*Atelestus collaris* LeConte 52-168.

*Endeodes collaris* LeConte 59-122; Horn 72-112, Blackwelder 32-134; Moore 54-196; Moore 56-220 (Larva); Moore 64-58.

*Color.* Piceus with the bases of the antennae, bases of the tibiae, the tarsi and trophi paler and the pronotum testaceous.

*Head.* Oval, one-third wider than long; tempora almost twice as long as eyes; surface densely, finely microreticulate; punctures moderately large, separated by less than their diameters; impressed in center of apical half; second antennal segment almost as long as third, tenth segment almost as wide as long.

*Pronotum.* One-third wider than long; widest in the middle; apex arcuate, apical angles broadly rounded, sides arcuate into the broadly rounded basal angles, base nearly straight but perceptibly emarginate in center. Surface without microreticulation, punctures feeble, generally separated by about their diameters, with a few dark scattered setae.

*Elytra.* One-fifth wider than long; humeral angles obsolete, sides arcuate into the broadly rounded outer apical angles and arcuate apex, inner apical angles broadly rounded. Surface rough and densely microreticulate, with fine pubescence and scattered erect setae. Punctures not apparent.

*Abdomen.* Feebly microreticulate with punctures generally separated by a little more than their diameters, with sparse pale decumbent pubescence.

*Length.* About 4.75 mm.

*Specimen described.* Female, Nanaimo, British Columbia, Canada, 16 June 1927, L. G. Saunders collector.

*Notes.* This species is distinct in the combination of the very small elytra and the piceus head. The elytra are very much smaller in relation to the pronotum than those of the other species except *insularis*. It is known from Vancouver Island, British Columbia to San Mates County, California. It is usually taken under drift on the beach below high tide mark.

*Endeodes insularis* Blackwelder

*Endeodes insularis* Blackwelder 32-134; Moore 54-196, 198; Moore 56-229 (Pupa?); Moore 64-58.

*Endeodes rugiceps* Blackwelder 32-135; Moore 54-196; Moore 56-220 (Larva); Moore 64-58

**New Synonym.**

*Color.* Entirely pale ferruginous except tip of mandibles black, eyes grey and abdomen entirely piceus.

*Head.* Oval, two-fifths wider than long; tempora slightly shorter than eye; surface very densely finely microreticulate; pubescence short, dense and fine with scattered short dark setae in basal half; flattened in center of apical half; antenna with second segment a little more than half as long as third, tenth about as wide as long.

*Pronotum.* One-half wider than long, widest at apical fourth, apex arcuate, apical angles broadly rounded, sides rounded into broadly rounded basal angles, base arcuate; surface feebly microreticulate, punctures dense, separated by less than their diameters, pubescence as on head with scattered short dark setae throughout.

*Elytra.* Each elytron very small, about one-fourth longer than wide, conjointly much narrower than pronotum; humeral angle hardly apparent, sides very weakly arcuate, apex broadly arcuate; surface rough, sculpture and pubescence similar to those of head; numerous short dark erect setae throughout.

*Abdomen.* Sculpture a fine dense microreticulation; pubescence fine, pale, decumbent, moderately dense.

*Length.* About 4.5 mm.

*Specimen described.* Paratype female, San Miguel Island, Santa Barbara County, California, 20 June 1910, V. W. Owen collector.

*Notes.* This species is distinct in its very small elytra combined with its red head. The elytra are very much smaller in relation to the head than any other species in the genus except *collaris*.

We have also examined one male and one female paratype with the same data as above and one male paratype from Prince Island, Santa Barbara County, California, 19 May 1919, E. P. Van Duzzee collector.

We have seen four paratypes of *E. rugiceps* Blackwelder from Carmel, Monterey County, California taken in March, May and June from 1912 to 1923. Two of these are males and two females. We can find no difference between these and the paratypes of *insularis* except that the femora and antennae of two of them are somewhat darker than those parts in *insularis*, a character that is variable in some species of the genus. Blackwelder (1932, p. 135) said of *rugiceps* "Male genitalia as in *collaris*." However, we have dissected a male paratype (Carmel, III-25-23, Blaisdell collection) and find the aedeagus to be the same as that of *insularis* as figured by Blackwelder (1932, p. 133, figs. 3F). Therefore, we conclude that *rugiceps* is a synonym of *insularis*.

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### BOOK REVIEW

**PEST CONTROL: A Survey.** Arthur Woods, Halsted Press, John Wiley & Sons, New York, 407 p. \$29.50. 1974.

This book can be recommended highly to all interested in the principles and methods of pest control. It is written as an introductory text, with carefully chosen examples of insect pests, diseases of plants, technological advances, and biological means of control. The author first defines pests and their control, as well as the economics of pest control and of methods used. Factors such as population density, death rate, and community stability are analyzed in the second chapter. The third chapter deals with the uses of chemical pesticides, as well as the economics of their production. Drawbacks of chemical control receive due attention in the fourth chapter. Biological control, including the use of insects, bacteria, viruses, fungi, higher plants, to mention the main ones, are outlined in the following 3 chapters, followed by newer approaches, such as sterilization, genetic control, pheromones, attractants, repellents, and the use of miscellaneous other control methods. Finally, integrated control is presented in proper perspective. The book is so written that it can be used not only by the professional scientist, interested in biology, agriculture, entomology, or ecology, but also by the general reader. To achieve this and not to oversimplify has been a difficult task solved by the author admirably. The book can be used as a text in university and college courses on pest control, conservation, and courses dealing with the impact of man on his environment. References are well chosen and the index is divided into 3 parts, listing separately diverse names and subjects, scientific names of species, including viruses, and Latin names.

I admired the readability of this excellent volume, a feature seldom found in technical books. Perhaps the fact that the author has written numerous articles for technical journals and that he has produced 6 courses on biological topics for the Australian television network have been responsible for this feature. The book would make a valuable addition to school libraries and public libraries everywhere.

Although the author modestly states that a book like his rapidly becomes out of date, this volume contains so much valuable information and presents it so well that it will be used as a reference in the years to come. Efficient pest control is urgently needed and if adequate awareness of population control becomes a reality, mankind might find a way of survival. Otherwise, even the best control methods will merely postpone the doom. Producing more food is a necessity but producing adequate amounts of food for an uncontrolled population of the world is an impossibility.

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